

## Projection/Reflection Heads-up Display, Phase I

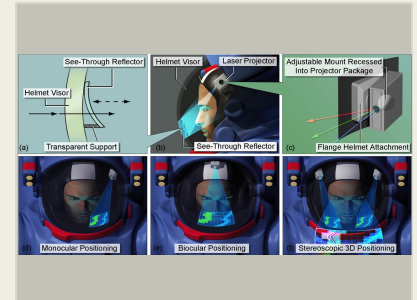
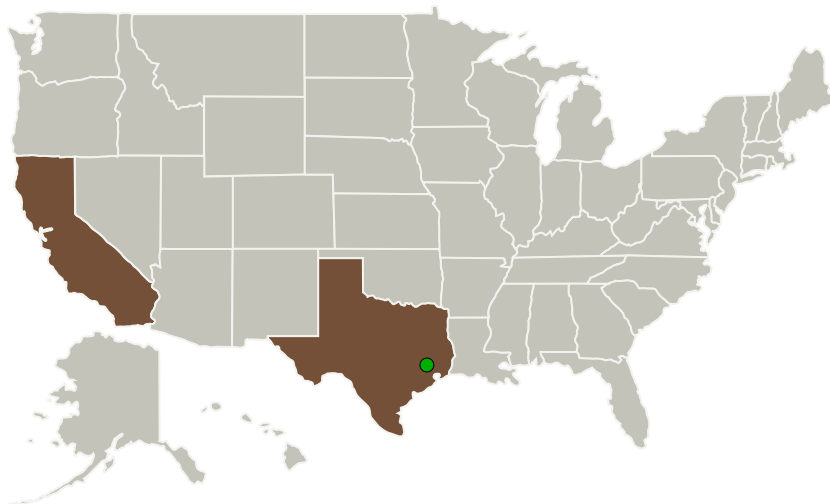
Completed Technology Project (2013 - 2013)



## Project Introduction

To address the NASA need for an EVA information display device, Physical Optics Corporation (POC) proposes to develop a new Projection/Reflection Heads-up Display (Pro/Ref-HUD) based on innovative integration of laser projectors and optics. This approach incorporates miniature full-color laser light sources and low-profile narrowband reflective, see-through toroid-shaped optics, which enable us to meet NASA EVA requirements for displays that are completely decoupled from the user's head and achieving full sunlight readability with automated rapid ambient light response. The Pro/Ref-HUD offers full-color, high-resolution collimated images, with large fields of view, highly suited to the space and weight constraints inside an astronaut's suit. POC plans to demonstrate the feasibility of the Pro/Ref-HUD system by building and testing a preliminary prototype to TRL-4 by the end of Phase I. POC plans to develop in Phase II a fully functional prototype to demonstrate sunlight readability and SXGA resolution, investigate thermal and radiation issues, and analyze ignition safety due to a 100% oxygen operating environment and vacuum and extreme temperature storage environments. The results demonstrated will offer NASA capabilities to perform EVAs with heads-up displays internal to the helmet to improve crew safety and comfort and prevent misalignment of the display.

## Primary U.S. Work Locations and Key Partners



Projection/Reflection Heads-up Display

## Table of Contents

Project Introduction	1
Primary U.S. Work Locations and Key Partners	1
Project Transitions	2
Images	2
Organizational Responsibility	2
Project Management	2
Technology Maturity (TRL)	2
Technology Areas	3
Target Destinations	3

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Organizations Performing Work	Role	Type	Location
Physical Optics Corporation	Lead Organization	Industry	Torrance, California
● Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
California	Texas

## Project Transitions

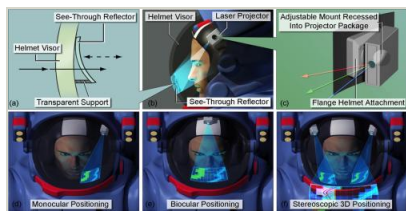
▶ **May 2013:** Project Start

✓ **November 2013:** Closed out

## Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140401>)

## Images



## Project Image

Projection/Reflection Heads-up Display

(<https://techport.nasa.gov/image/127192>)

## Organizational Responsibility

## Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

## Lead Organization:

Physical Optics Corporation

## Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

## Program Director:

Jason L Kessler

## Program Manager:

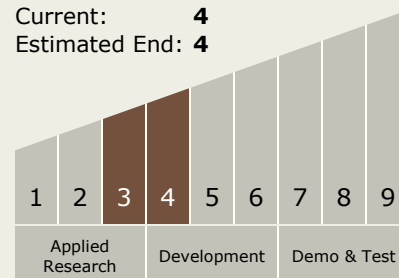
Carlos Torrez

## Principal Investigator:

Jason Holmstedt

## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



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### Technology Areas

#### Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - └ TX06.2 Extravehicular Activity Systems
    - └ TX06.2.3 Informatics and Decision Support Systems

### Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System